

Docket No.: 03-01 US

REMARKS

In a non-final Office Action of May 16, 2007 the Examiner rejected Claims 1-18 pending in the subject application. Applicant presents the arguments responsive to the Examiner's rejection in view of which reconsideration of rejections is respectfully requested.

CLAIMS REJECTIONS - 35 U.S.C. § 102

The Examiner rejected claim 1 under 35 U.S.C. § 102 (e) as being anticipated by Sampath (US patent 7,149,254 B2). According to the Examiner's interpretation of transmission system shown in Fig. 5 with corresponding description of this figure in the specification, Sampath teaches each and every limitation of Claim 1 of the subject patent application. The Examiner equates Sampath's method for preprocessing transmit signals in spatial multiplexing performed by diversity systems that include multiple transmit antennae with claimed method of phase conjugated vectoring of signals in telephone cable with a plurality of twisted pairs. In another words, the Examiner considers that, pre-processing signals in "multiple transmit antennae" is basically similar to pre-processing procedure in "phase conjugated vectoring antennas (PCV)". Applicant respectfully disagrees with this rejection and the arguments on which it is based for the following reasons.

Signal pre-processing to improve signal- to- noise ratio is well-known technique in different types of telecommunication networks, such as networks of microwave antennae for cellular phones or networks of telephone cables of land phone lines. Sampath's antennae are microwave antennae, and the method of pre-processing described by Sampath "includes generating a representative correlation matrix based upon estimates of a correlation between each pair of the plurality of antennae."

The signal of pre-processing in the cable of n twisted pairs also may be presented by a matrix equation (see references in the "Background of the Invention" section of subject patent application), with similar advantages and drawbacks. Thus, generating a representative correlation matrix for Sampath antennae and presenting a matrix equation for twisted pairs in the telephone cable could be basically the same procedure providing that by the time the transmitted signal reaches the receiver, this pre-distortion is fully compensated by pair-to pair

Docket No.: 03-01 US

(or antenna to antenna) interaction. At this point commonality between Sampath technique and present invention ends.

The claimed invention addresses complications of practical implementation of the conventional vectoring (or Sampath representative correlation matrix). Vectoring, though attractive in respect of reducing or eliminating crosstalks is a technically difficult tool when implemented. There is no commercially available system on the market with signal vectoring. One of the biggest practical difficulties is that, after the cable of n twisted pairs is presented by a matrix equation with n^2 matrix elements, these matrix elements have to be determined by sequential pair-by-pair measurements at opposite sides of all pairs with multiple equipment reconnections. As described in subject Patent Application, for any appreciable number of pairs $n \gg 1$, reliable definition of matrix elements is problematic. The object of the claimed invention is to simplify and to increase accuracy of creating and solving the matrix equation in the prior art by introducing a "plurality of bundles of said selected twisted pairs for creating a corresponding plurality of phase conjugated vectoring antennas (PCV)".

In the claimed invention, physical phenomena of phase conjugation is applied to signal transmission in telephone cable: the reference signal is propagating from a receiver site via one twisted pair for obtaining a waveform of PCV reference signal at a transmitter site; PCV antenna bundle is established for each twisted pair; complicated calculations of matrix elements is substituted by simple summation of complex amplitudes (see the detailed description of the specification of the subject patent application.) Phase conjugated vectoring is not disclosed or contemplated by Sampath or any prior art cited by the Examiner or known to Applicant. Therefore, Fig. 5 does not describe or imply any of these steps since it refers to different technique of signal processing. The present invention applies the optical phenomena of phase conjugation to overcome shortcomings of conventional vectoring in low-frequency range.

CLAIMS REJECTION - 35 U.S.C. § 103

The Examiner rejected Claims 2-5 and 8-12 as being unpatentable over Sampath (US 7149254 B2) in view of Miyoshi et al (US 6965649 B1) on the basis that "it would be obvious to one of ordinary skill in the art at the time the invention was made to add a propagation time of said reference signal via said twisted pair of Miyoshi et al to the method of Sampath in order to

Docket No.: 03-01 US

reduce delay "(underlined by Applicant). The Applicant respectfully disagree with this rejections in view of the reasons given above and the following reasons.

Claims 2-5 address an essential part of phase conjugation – adjusting relative phase contributions of all interacting pairs to achieve plane wave front propagation through the cable. To adjust these phases, measurement of time propagation is required. Measuring propagation time in Miyoshi et al has nothing to do with the purpose why this procedure is performed in the claimed invention. Besides using the different technique of prosecuting signals in twisted pairs, Miyoshi is measuring time propagation to reduce delay of signal. The subject invention comprises the step of measuring propagation time for performing a phase conjugation process for telephone cables. The combination of these two references will not be considered by anyone skilled in the art for the purpose of measuring propagation time for the method taught by Sampath.

The Examiner further rejects Claims 6 and 7 as being unpatentable over Sampath (US 7149254 B2), Miyoshi et al (US 6965649 B1) and further in view of Cioffi (US 5887032) on the basis that "it would be obvious to one of ordinary skill in the art at the time the invention was made to add the memory of Cioffi to the system of Miyoshi et al as modified by in order to store the bitmaps, with the motivation....to reduce cost problem. (underlined by the Applicant)" The Applicant respectfully disagrees with the Examiner's conclusion.

The essence of Claims 6 and 7 is to introduce basic procedures essential for wave front reconstruction, not for cost reduction. The fact that the results of several measurements are stored in memory is not important, they could be written on piece of paper; the essence is that the parameters stored by Cioffi are entirely different from parameters of the present invention, and to the person of ordinary skill in the art at the time the invention was made to adding memory of Cioffi to the system of Sampath and Miyoshi would make no sense and produce nothing in common with the subject of the claimed invention.

The Examiner further rejects Claims 13 and 14 as being unpatentable over Miyoshi et al (US 6965649 B1) in view of Cioffi (US 5887032) on the basis that "it would be obvious to one of ordinary skill in the art at the time the invention was made to integrate the components of

Docket No.: 03-01 US

Cioffi to the system of Miyoshi et al in order to reduce the processing needed to implement NEXT cancellers. The Applicant respectfully submits that this rejection is inappropriate.

The claimed system implementing cross-talk cancellation has specific units to perform the invented method of Phase Conjugated transmission. If one of ordinary skill in the art at the time the invention was made to integrate the components of Cioffi to the system of Miyoshi, this combination would never result in phase conjugated transmission system.

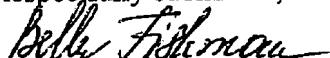
Compilation of the systems' elements, which are not intended for phase conjugated transmission, would not help to build the system of the claimed invention. Therefore the rejection of claims 15 and 16 as being unpatentable over Miyoshi et al (US 6965649 B1), Cioffi (US 5887032), Sands et al (US 6134283) and Amrany et al (US 6999504 B1) is not proper. It should be appreciated that the terminology used in the cited references may sound similar (propagate input data from the transmitter site to the receiver site or using second buffer/encoder), but are applied to the entirely different technique and systems in comparison to the claimed invention.

It is respectfully submitted, that the Examiner rejected all the claims of the patent application by arbitrary combining several teachings related to compensation of cross-talk in complicated transmission environments. None of the cited references provides even a hint to utilize the physical effect of phase conjugation in telephone cables, which allows for offering vast improvement of broadband transmission via telephone cables by crosstalk reduction.

CONCLUSION

In light of the above remarks, it is respectfully submitted that the present application is in proper condition for allowance, and an early notice to such effect is earnestly solicited. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

Respectfully submitted,



Bella Fishman
Agent for Applicant
Registration No. 37,485
tel. 650.856.3571

Dated: August 15, 2007
Fishman Consulting
558 Cambridge Ave
Palo Alto, CA 94306